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ARMY AVIATION RISK-MANAGEMENT INFORMATION

NOVEMBER 2002 ✦ VOL 30 ✦ NO 11

UH-60 Safety Performance *Review*

PLUS: Apache pilots talk about HMD issues.

Flightfax

ARMY AVIATION RISK-MANAGEMENT INFORMATION

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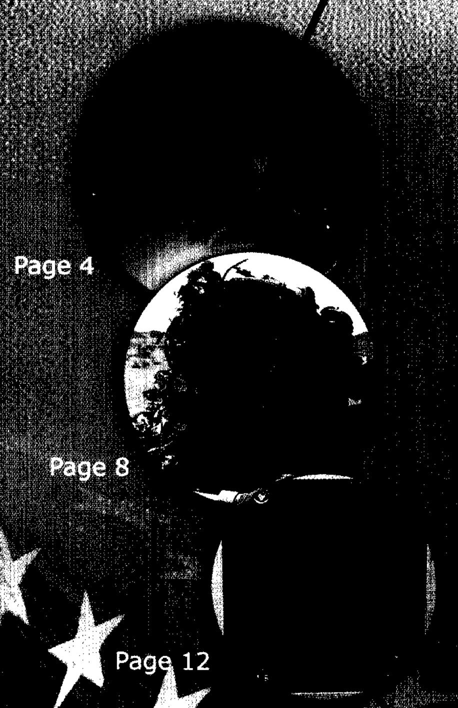

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POV FATALITIES through 30 September

FY02	FY01	3-yr Avg
113	99	112

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James E. Simmons
Brigadier Gene

DASAF's CORNER

from the Director of Army Safety

The Holiday Season and Reflection

We are each privileged to serve in the finest Army our country has ever known. For more than 220 years, this great Army has existed to fight and win our Nation's wars. Today we are more than a year into this war on terrorism, and I can tell you—without any hesitation—that all of our soldiers and units have performed magnificently both on the battlefield and in training as we prepare for combat.

As we enter this holiday season, reflecting on the events of the past year gives us an even greater appreciation for the tremendous job you do every day. We have prosecuted this war in some of the most dangerous terrain on the face of the earth, in possibly the most unforgiving aviation environment the Army has ever encountered. Because of your efforts and skills, our Army has been successful where others before us have failed. We have succeeded and will continue to succeed because great soldiers like each of you were able to effectively manage risks involved in those operations. Your skills in identifying and assessing hazards and being able to define and implement controls to reduce risks helped us to be successful with minimal losses.

I personally thank you for your willingness to serve and for the great job you are doing. And, I would be terribly remiss if I failed to also thank the families and friends who support you and allow the Army to use your skills and talents as we continue to prosecute this war on those who wish us harm.

Many of you will enjoy the comforts of home and the joys of being with family this holiday season. If you are traveling, I urge you to be extra cautious, as POV accidents are still the number one killer of our soldiers. Be extra vigilant in identifying, assessing, and controlling hazards. A moment's lapse in awareness can easily result in tragedy.

For those who are deployed in support of Operation Enduring Freedom or to any of the many other points around the world with an American Army presence, know that our thoughts and prayers are with you.

To all of you who each day put your life on the line to defend this great country, have a safe and happy holiday season and know that we, as a Nation, are truly grateful for your service.

Train hard and play hard, but be safe!

James E. Simmons

COVER STORY

Spotlight

UH-60 Safety Performance Review

Since FY98, there have been 147 UH-60 Class A through C accidents. These accidents cost the Army $101,952,516 and resulted in 25 fatalities and 5 permanent disabling injuries. Highlights of the accidents follow.

Tree strikes

There were 24 accidents involving tree strikes during flight. The majority of the tree strikes occurred during terrain flight, and over half involved night vision goggle (NVG) flight. Low illumination, fatigue, high workload, scanning, and crew coordination breakdowns were contributing factors in some of these accidents.

A hazard associated with the UH-60 is

airframe vision blockage. The windscreen structure is such that it significantly blocks the aircrew's direct and peripheral vision for detecting obstacles in several quadrants. This hazard has contributed to accidents involving mid-air collisions and tree strikes.

Mid-air collisions

There were two accidents involving mid-air collisions during this timeframe, and both occurred during night NVG flight. One of these was a Class A accident that resulted in six fatalities, numerous injuries, and two destroyed aircraft. The latter accident involved multi-ship, sling load operations under NVGs with degraded visibility due to rain showers and zero percent moon illumination (see scenario below).

Controls to mitigate these hazardous conditions include having all formations adopt a straight trail formation at the release point before attempting the turn to final; reducing the formation's airspeed (the aircraft with the heaviest load should be lead); increasing the distance between serials to allow more reaction time; or, if feasible, delaying the mission until the weather clears. Thorough planning and mission rehearsals should be conducted. Control measures and abort criteria should be established and understood by all concerned. Emphasizing the need to scan repeatedly beyond the door post for converging aircraft also will help prevent these types of accidents.

Scenario: During a night NVG terrain multi-ship air assault mission, a flight of four UH-60L aircraft were executing a 180-degree right turn to final while in a staggered right trail formation. The crew of the trail aircraft failed to maintain separation from the lead aircraft. The trail aircraft (sling loading an M998 HMMWV) collided mid-air with the lead aircraft. Both aircraft crashed and were destroyed. All 6 occupants on board the trail aircraft were fatally injured, and 5 of 11 personnel on board the lead aircraft sustained survivable injuries.

Brownout or whiteout

There were 15 accidents involving spatial disorientation resulting from rotor-induced brownout or whiteout conditions. Of these, 80 percent involved night NVG missions, and 77 percent involved single-ship operations. Briefing the procedures and crew responsibilities for brownout or whiteout conditions before takeoff will mitigate this hazard.

In-flight part or component detachment

There were 11 accidents where an external aircraft component or part came loose from the aircraft during flight. All of these incidents resulted in foreign object damage (FOD). Seven of these incidents were caused by materiel failure of the component, and three of these seven involved the de-ice cable on the tail rotor. In the remaining four accidents, improper maintenance procedures and/or inadequate preflight inspections by the aircrew caused an unsecured access cover or door to open in flight. In one case, auxiliary power unit (APU) readings were taken after the pilot-in-command (PC) completed the preflight inspection, but were not annotated in the logbook. The crew chief had closed the APU access cover but had not secured the latches.

FOD

There were 10 accidents attributed to FOD (excluding those mentioned in the previous paragraph). Half of these accidents were caused by a lack of tool accountability during maintenance. The other half were caused by rotor wash blowing unsecured items outside the

aircraft (e.g., parachute deployment bag).

Hard landings

There were 10 instances of hard landings that caused the main rotor blades to flex and strike external aircraft components and the fuselage. These accidents were evenly split between day and night. Pilots were conducting roll-on landings to an unimproved, dusty surface in half of these cases. Seven of the 10 accidents involved the ALQ-144 antenna. The height of the ALQ-144 antenna and its location on the aircraft makes it susceptible to main rotor blade strikes during hard landings and/or excessive aft cyclic inputs while landing.

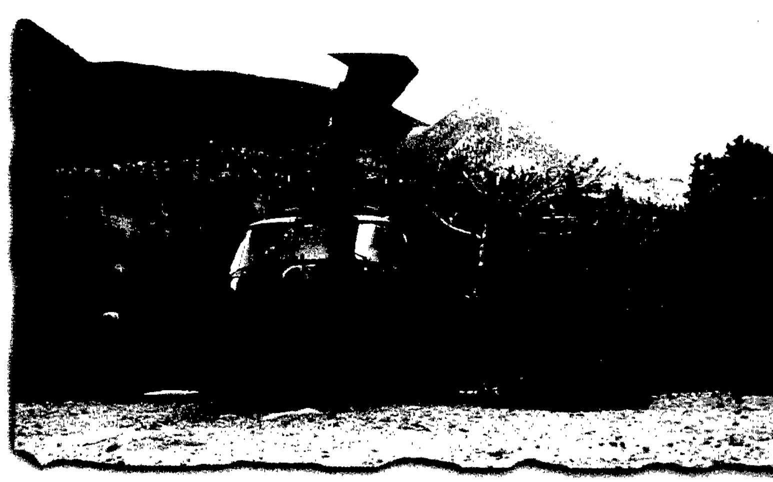
Power management

Army aviators have become conditioned to the benefits of seemingly unlimited power from modern multi-engine aircraft often operated at low pressure and density altitudes and temperatures. Many units are deployed to areas very different environmentally from home base, operating in both high pressure and density altitudes and temperatures.

These conditions, along with the high gross weights associated with many mission profiles, often increase demand for power beyond engine capability. The process of confirming power requirements with power available requires continual awareness and constant performance planning. However, performance planning is not enough. Aviators also must fully understand how power-limited aircraft will perform during all phases of the mission. Only through a thorough knowledge of the aerodynamics of maneuvers, coupled with good knowledge of the PPC, can a pilot make an effective decision when presented with a power-critical situation. Understanding how wind, descent rate, temperature, turbulence, and other factors influence regular maneuvers is one of the best defenses against this hazard. (The "Power Matters" video on the U.S. Army Safety Center Web site, **http://safety.army.mil**, is a good educational tool.)

There were seven accidents in this timeframe (including four that were either Class A or B) that were caused by lack of proper aircraft power management procedures. Total flight hours for the instructor pilots (IPs)/PCs involved in the Class A and B accidents ranged from 1,567 to 5,028. The recency of mountain flying experience was a factor in Scenario 1 below. The IP was qualified, but not current, in the mountain environment. One of the seven accidents involved settling with power (see Scenario 2). Conditions conducive to settling with power are a vertical or near-vertical descent of at least 300 fpm and low forward speed (FM 1-203). The accident described in Scenario 2 replicates these conditions.

Scenario 1: Due to a last-minute cancellation of the planned mission, the IP decided to take advantage of the downtime and conduct mountain qualification training. Due to the compressed schedule, there was insufficient time to plan thoroughly and execute the opportunity training. The IP did not account for extra equipment in the cargo and transition sections of the aircraft. In addition, he incorrectly computed the arrival fuel weight by failing to accurately compute the en route time and fuel consumption estimate. The IP made the decision to fly the route in reverse to give thunderstorms time to clear. The modified plan was to fly directly into the mountains, conduct the required takeoffs and landings, and then fly the course in reverse. The miscalculation of departure weight, compounded by the error in the amount of fuel that would be expended en route to the landing zone (LZ), resulted in the aircraft weighing



over 1,000 pounds more than predicted. In addition, the power required to hover in ground effect (IGE) was one percent more than the maximum torque available. During the approach to the 10,800-foot mean sea level (MSL) LZ, the rotor rpm began to decay and the aircraft descended into trees approximately 50 feet short of the intended landing point. The aircraft sustained moderate damage, and the crew was uninjured.

Scenario 2: The PC initiated a downwind vertical descent from a 500-foot above ground level (AGL) out of ground effect (OGE) hover, with the intent of maintaining a 100 fpm rate of descent. He directed his attention to maintaining his position over the ground, to the exclusion of monitoring his rate of descent. The descent increased to about 300 fpm and the aircraft continued to ground impact. The aircraft incurred major damage, and the crew and passengers sustained minor injuries.

Wire strikes

There were four wire strikes. The accidents were evenly split between day and night, and half involved multi-ship operations. In three of the four, the aircrew was flying low level at airspeeds ranging from 70 to 100 knots indicated airspeed (KIAS). In one case, the aircraft was on approach to an LZ and hit wires that were obscured by trees. In another, the aircrew was flying multi-ship in the center of a valley (scenario below). Controls to mitigate this hazard include negotiating wires at or near the stanchions or at an altitude to safely clear the wires.

Scenario: During conduct of a day multi-ship aerial reconnaissance at approximately 95 KIAS, the lead aircraft flew down the center of a valley. The pilot of the accident aircraft attempted to cross over high-tension wires at mid-span in the middle of the valley, rather than at or near the poles on the hilltops. The pilot initiated a gradual climb to clear the three high-tension wires, but the main rotor blades struck one of two 3/8-inch diameter static discharge lines that were about 70 feet above the high-tension wires. The aircraft descended to impact in a right spin through the trees, coming to rest on its left side. The aircraft was damaged extensively and all six occupants were injured.

Inadvertent IMC

There was one accident during this timeframe that was attributed to inadvertent instrument meteorological conditions (IIMC), which resulted in three fatalities. It is suspected that the crew attempted to maintain visual flight rules (VFR) rather than executing one of three options: filing and executing an instrument flight rules (IFR) flight plan; modifying the route of flight to ensure VFR flight conditions; or landing the aircraft at a suitable area and waiting for improved weather.

IIMC-related accidents are deadly. The September 2002 issue of *Flightfax* ("Sometimes the Envelope Pushes Back") lists specific controls that individual aviators, IPs, and commanders can implement to mitigate this hazard. The U.S. Army Aeromedical Research Laboratory (USAARL) at Fort Rucker has developed spatial disorientation (SD) awareness training scenarios for VFR in the UH-60, AH-64, and CH-47 simulators. These scenarios replicate the conditions and events that have occurred in actual SD accidents. (Scenarios can be obtained from USAARL, DSN 558-6936, **http://www.usaarl.army.mil**.)

Risk management

In three of the UH-60 accidents, a deviation from the original plan occurred due to time constraints or weather, which resulted in procedural shortcuts. The individuals involved had good intentions—they were just trying to accomplish the mission. Mission changes are necessary and a daily fact of life; however, they must be risk managed. Realistic training requires a "crawl-walk-run" approach and thorough planning to prevent needless casualties and loss of equipment. ■

Editor's note: This review covers fiscal years 1998 through 2002 (as of 16 Sep 02).

—Charisse Lyle, Operations Research and Systems Analysis Division, DSN 558-2091 (334-255-2091), charisse.lyle@safetycenter.army.mil

Been There, Done That

We've all heard this saying over and over again when someone brings up something we've already done. Unfortunately, when my phone rang one night in August, I had to say it as well. The phone call was part of the notification process that goes through the leadership of the Safety Center when a Class A or B accident occurs anywhere in the world. In this case, the "been there, done that" was another UH-60 NVG brownout accident.

The August accident was the third in a series of eerily similar Class A accidents involving UH-60s in desert conditions in a little over two years. Each accident involved a crew from a rotational unit. Each crew was comprised of a very experienced aviator, in two cases an instructor pilot, and a first-tour aviator. Each accident occurred while using night vision goggles. Each occurred when the crew failed to properly respond to the dusty conditions of the desert. Each resulted in a totally destroyed UH-60 and some very painful injuries. Fortunately, the crashworthiness of the UH-60 kept everyone involved alive.

A review of the three accidents revealed that though there were the similarities listed above, there were distinct differences between them. Additionally, these three accidents are representative of three trends we are seeing across the Army over the last two years: crew coordination failures, recency of training experience shortcomings, and lack of adherence to standards.

Accident #1

The PI had been flying for almost an hour doing dust landing qualifications. The highly experienced IP told him to take a break and decided to demonstrate a crosswind approach and takeoff. He executed the approach without any problems and began the takeoff with a stiff right crosswind. Several factors led him into a shallow left turn as he began the takeoff. This put the aircraft in a tailwind condition and the power applied was insufficient to continue a climb. The aircraft never cleared the dust cloud, struck the ground, bounced, rolled, and came to rest on its side. The IP and one of the crew chiefs were hospitalized for significant injuries.

Interviews revealed that the PI and both crew chiefs knew that the aircraft was in the shallow left turn, but none of them said anything to the IP. They all knew him very well and had complete faith in his flying ability. They assumed that the turn was intentional even though he had not announced it. This CREW COORDINATION FAILURE is commonly referred to as excessive professional courtesy. In this case, the PI and the two CEs trusted the IP to the point of allowing him to crash the aircraft. No one said a word as an unannounced left turn led to the accident.

"The PI and the two CEs trusted the IP to the point of allowing him to crash the aircraft."

Accident #2

The battalion SP and a PI were conducting sling load operations in the desert at night as part of reception, staging, onward movement, and integration (RSOI). Although the crew had not executed night sling loads during their home station training, the SP went out himself to execute the first iterations.

After having significant difficulties getting

over and hooking up the load, the crew prepared for takeoff. As they began the takeoff, they unintentionally began a turn into a crosswind condition. The power applied was not sufficient to clear the sling load and it struck the ground. This started a chain of events that led to complete destruction of the aircraft. As part of the crash sequence, the PI was ejected—seat and all—from the airframe and was discovered by rescue crew over 75 feet from where the seat left the fuselage. Once again, the crew was fortunate and everyone survived, though two crew members required extensive surgery.

In this case, the SP and his crew attempted a maneuver in which they HAD LIMITED RECENT EXPERIENCE in extremely difficult circumstances. The OPTEMPO of the unit at home station had not allowed for a thorough training program to prepare for executing night sling loads in the desert. Then during RSOI, because of an intense desire to accomplish all the missions during the rotation, the crew attempted to go from a "crawl to a run" in a very difficult environment.

"The PI was ejected—seat and all—from the airframe and was discovered by rescue crew over 75 feet from where the seat left the fuselage."

Accident #3

This accident, the one that caused the "been there, done that" response mentioned before, happened as the UH-60 crew was returning from a night downed aircraft recovery team (DART) mission. After dropping off the DART, the crew was headed back to the assembly area when they realized they needed to go through the FARP prior to shutting down. The PI was on the controls as they approached the FARP and executed an approach to a hover that overshot the intended landing point. The PC came on the controls and attempted to hover backwards in brownout conditions. He lost visual references and then attempted to fly out of the conditions. The aircraft struck the ground, rolled over, and eventually came to rest on its side. Once again, the crew was extremely lucky to have survived, though there were broken bones and a punctured lung among them.

"The crew attempted to hover in brownout conditions instead of executing a go-around when they overshot their intended landing point."

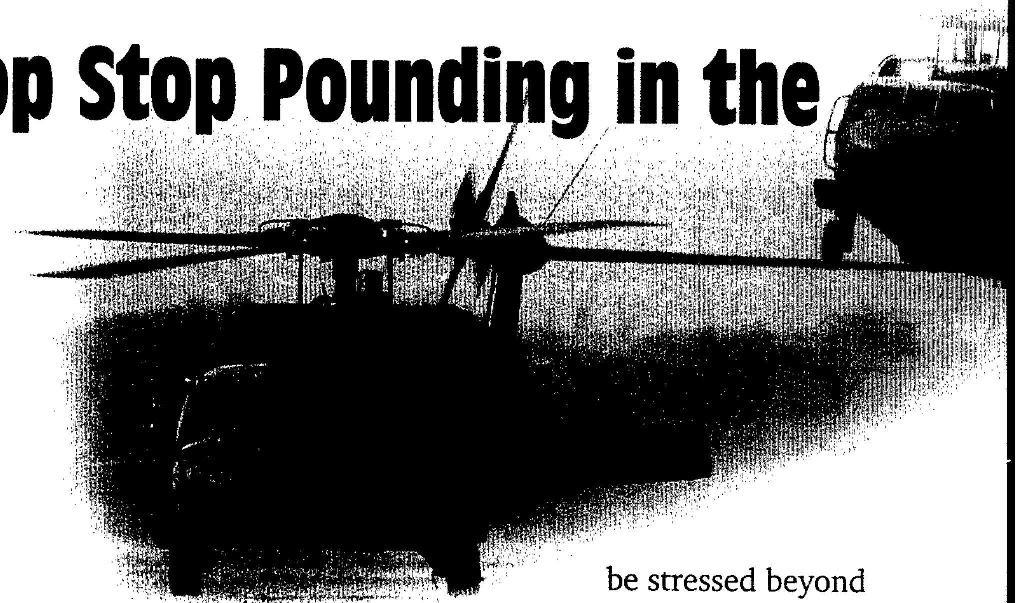
In this case, the crew FAILED TO ADHERE TO ESTABLISHED STANDARDS by not executing a go-around when they overshot their intended landing point. By attempting to hover in brownout conditions, they put themselves in a situation from which they could not recover. Hovering backwards just made it that much worse.

These accidents are unfortunate examples of what the Safety Center sees around the world. All three of these Black Hawk accidents happened within 20 miles of each other over a period of 26 months. One of the three problems mentioned before (improper crew coordination, inadequate recent experience, or failure to adhere to established standards) contributes to almost every human error accident we investigate. Each of these three areas requires command involvement and enforcement.

Commanders must ensure aircrews practice crew coordination routinely. They must also have a complete understanding of the capabilities and recency of experience of their crews, and be willing to turn down any mission for which the unit is not prepared. Lastly, enforcement of standards at every level is a responsibility that we all have, to not only prevent future accidents but to ensure we are ready to execute our primary mission of fighting our Nation's wars when called upon. ■

—USASC Aviation Systems and Accident Investigation Division, DSN 558-9552 (334-255-9552)

Avoiding Droop Stop Pounding in the Black Hawk



The UH-60 main rotor is equipped with droop stops and flap restrainers to prevent extremely high or low blade flapping at low rpm. As rotor speed is increased to approximately 70 to 75 percent rpm, the droop stops rotate from their "static" to their "dynamic" position. The audible knocking of droop stops during engagement or shutdown, as they are rotating between the static and dynamic position, is a good indicator to the pilot of droop stop pounding (DSP).

To avoid DSP during rotor run up or shutdown, the cyclic must be centered or displaced very slightly into the prevailing wind. The collective should be raised no more than one inch above full down and pedals centered. If possible, shutdown should be avoided until adjacent helicopters are at flat pitch.

DSP can also occur with the droop stops in their dynamic position, usually with excessive aft cyclic, low collective, and with all wheels on the ground. Although DSP can occur during rearward taxi (prohibited by the operator's manual) and downslope landings, the maneuver that is most likely to produce DSP is the roll-on landing. Aerodynamic braking with cyclic is permissible while the tail wheel is on the ground before main gear contact.

Once the main wheels contact the ground, the cyclic must be centered, collective lowered (center cyclic before lowering the collective), and brakes applied as required. (A complete description of the maneuver is given in TC 1-212.) Initiate all cyclic control input on the ground with sufficient collective input to maximize the effect of cyclic input, thereby minimizing cyclic displacement.

If a pilot attempts to slow the aircraft after main wheel contact by using extreme aft cyclic as he lowers collective, he will hear an audible 4/Rev knocking. This is the first indication of DSP. With more rear cyclic, severe DSP and contact with the ALQ-144 may result. Severe DSP can cause dynamic components to be stressed beyond design limits.

To avoid DSP during a roll-on landing:

■ Keep speed in accordance with TC 1-212 (60 knots or below) before touchdown. Effect termination by making the tail wheel touchdown above effective translational lift (ETL), but below 60 knots ground speed.

■ Be aware of the tip path plane—excessive aft cyclic will place the tip path unusually high in your field of view.

■ After landing, neutralize (center) the cyclic before lowering the collective.

Excessive forward cyclic during taxiing can lead to DSP. If a pilot habitually places his tip path too low during ground taxi, he may encounter DSP during right turns because of the Black Hawk's longitudinal-to-yaw control mixing. A good rule for cyclic placement during ground operations is to keep the tip path plane about one hand-width below the top of the windscreen. ■

FOD—Find It!

We've all heard stories of surgeons leaving forceps or some other instrument enclosed in a patient's abdominal cavity following an operation. Well, if true, the medical profession is not the only party guilty of this practice. Here are some recent foreign object damage (FOD) incidents:

■ A 9/16-inch socket was found on a UH-60A aircraft during preflight in the vicinity of the intermediate gearbox. This caused a 100 percent FOD check to be completed on the tail pylon, main drive shaft area, and the hydraulic and engine decks prior to flying 2.0 NVG hours. The next day, the aircraft flew 1.8 hours on a day multi-ship mission. Upon completion of the mission, a 10-hour inspection was initiated. A breaker bar was found in the tail rotor drive shaft access compartment on a tail pylon support bracket. Damage was discovered to the right hand tail rotor cable guide, a hyloc rivet, and a doubler hole.

■ While performing a tail rotor radar alphanumeric display system (RADS) maintenance operational check (MOC) on a OH-58DR and with the aircraft at idle, the PC heard a faint noise followed by mild feedback in the flight controls. Ground personnel heard a loud noise, witnessed a decrease in tail rotor RPM, and the MOC was aborted. Post-flight inspection revealed that a can of dye-penetrate was inadvertently left under the tail rotor drive shaft after a tail boom nondestructive inspection. This caused an 8-inch section of the tail rotor drive shaft to shear. The aft section of the tail rotor drive shaft was replaced and the aircraft was released for flight.

■ During a landing approach, the crew felt a binding or ratcheting in cyclic. The OH-58DI aircraft landed and a normal shutdown was performed. Maintenance personnel found a piece of safety wire wedged in the uniball assembly. The wire was removed and the uniball inspected and checked. The aircraft was then released for flight.

■ While performing a HIT check on the #1 engine of a UH-60A during an MOC, the crew heard a low aerodynamic "hum," followed by a shudder in the aircraft, a loud "pop," and the aircraft lurched. The PC performed an emergency engine shutdown. The #1 engine Np reached 130 percent for 1 or 2 seconds prior to collective full down. The #1 engine was shutdown, followed by the #2 without further incident. Inspection revealed damage to the #1 engine, high speed shaft, L/H input module, and inlet guide vanes.

FOD has been and will continue to be a major player in aircraft damage. We must all take an active approach to limit the destruction which is caused by inadvertently leaving tools, nuts, bolts, safety wires, and other objects on or near our aircraft. The above instances point out the fact that we all must become FOD finders. We must perform those 100 percent FOD inspections when we perform maintenance actions in order to eliminate this type of damage. The moral is if you accidentally drop an object, whether it is a nut, bolt, tool, shop towel, or whatever, or if you can't locate an item you know you had with you while performing maintenance, FIND IT—before you button up the aircraft. ■

Before you button up the aircraft—

■ Ensure all tools, hardware, and other equipment are properly accounted for at the end of each maintenance operation (AR 385-95).

■ Require an entry on maintenance paperwork that a FOD check was conducted and tools are accounted for prior to releasing an aircraft after maintenance. (Someone other than the individual performing maintenance should sign off on the paperwork.)

■ Mark tools for ease of accountability (AR 385-95). Etch tools by toolbox number for quick and easy identification. Ensure duplicate toolbox numbers do not exist (AVIM and AVUM). Paint tools a bright color to aid in identifying tools left on an aircraft.

■ Conduct toolbox inventories.

TCAS Tragedy

Collision in Germany is the first of the TCAS era.

A recent commercial airline accident in southern Germany illustrates the need for Army fixed-wing pilots to closely adhere to correct procedures when replying to a Traffic Alert and Collision Avoidance System (TCAS) Resolution Advisory (RA).

On 1 July 2002, a Bashkirian Airlines Tupolev TU-154 collided mid-air with a DHL Boeing 757 near the town of Ueberlingen, Germany. Both airplanes were equipped with TCAS II equipment and operating at flight level (FL) 360 (36,000 feet).

The TU-154 had been instructed by ATC to descend to FL 350 for separation purposes, but did not respond to the first ATC transmission for some unknown reason. The controller reissued the descent clearance and the TU-154 began a descent. Simultaneously, the TCAS in the TU-154 issued a CLIMB advisory and the TCAS in the B-757 issued a DESCEND advisory (31 seconds prior to the collision). The crew of the B-757 correctly initiated a descent; the TU-154 crew ignored the TCAS advisory and continued to comply with the instructions issued by ATC. The aircraft collided in visual meteorological conditions (VMC) at FL 354. Both aircraft were destroyed with no survivors at approximately 2235 local time.

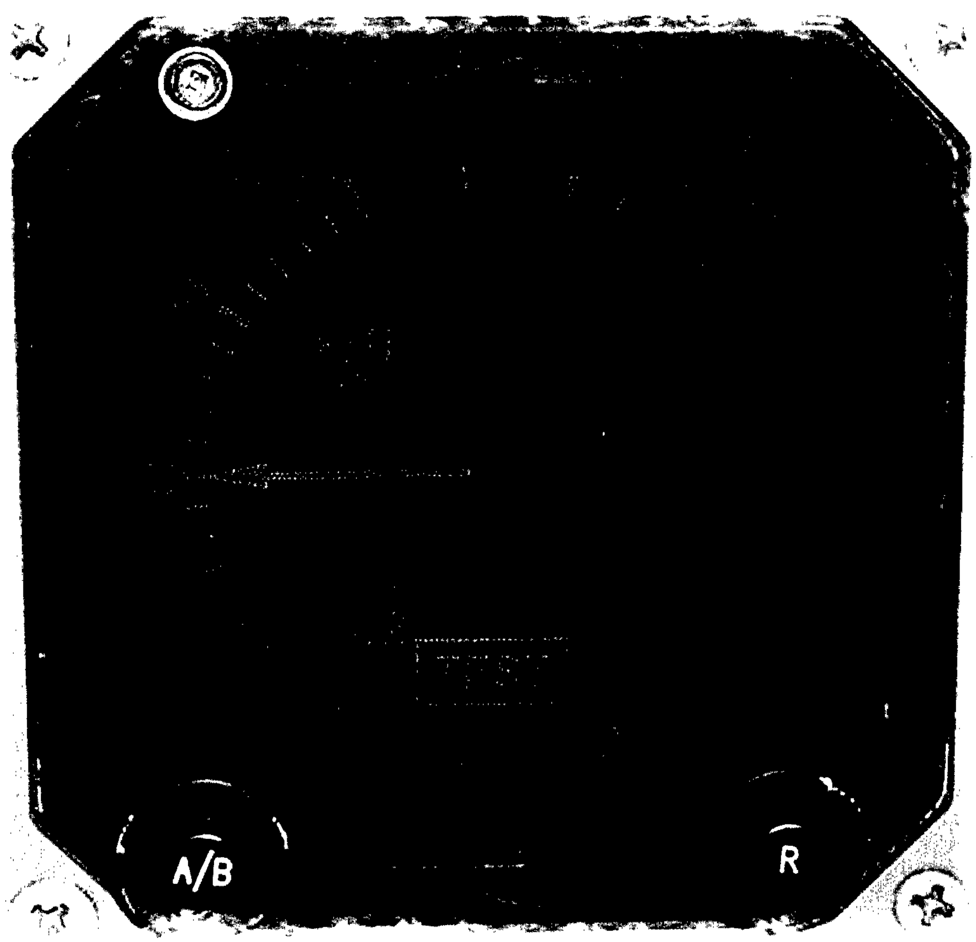
Air traffic control radar

To understand how this accident happened, let's look at the limitations of ATC radar. When a "loss of separation" between aircraft is likely to occur or has occurred, the ATC controller has to: detect the conflict using radar, assess the situation, develop a solution in a very short period of time, and communicate this solution to the aircrews as quickly and clearly as possible.

The ATC radar displays are usually provided with data by a radar data processing system (RDPS), whose inputs come from secondary surveillance radars (SSR) with an update or refresh rate (antenna sweep) of several seconds (4 to 10 on average and as high as 12 seconds). Altitude data is in 100-foot increments. Sudden vertical maneuvers may not be displayed immediately; altitude readouts may lag as much as 500 feet. The displayed vertical tendency may be erroneous in some cases.

Visual separation

You may wonder why the crews did not "see and avoid" each



TCAS test pattern on a C-12U cockpit display

other since the accident occurred in VMC. The visual assessment of traffic can be misleading especially at night and high altitudes.

■ At high altitude, it is difficult to assess the range and heading of traffic as well as its relative height.

■ At low altitude, the attitude of a heavy aircraft at low speed makes it difficult to determine whether it is climbing or descending.

■ Nighttime vision is prone to many illusions and the presence of the night blind spot makes target and traffic acquisition difficult.

■ Two aircraft can be in relative positions that make visual contact highly improbable.

■ Visual acquisition does not provide any information about the intent of the other traffic.

■ The traffic in visual contact may not be the threat that triggers the RA. A maneuver relative to the wrong visual traffic may degrade the situation against the real threat.

The crew of the B-757 correctly initiated a descent; the TU-154 crew ignored the TCAS advisory and continued to comply with the instructions issued by ATC. The aircraft collided in visual meteorological conditions (VMC) at FL 354. Both aircraft were destroyed with no survivors.

TCAS advantages

■ Interrogates the transponders of other aircraft twice per second, computes the bearing and altitude of the other aircraft, displays their location and relative altitude on the TCAS display in the cockpit, and provides aircrews with commands to avoid other Mode C transponder equipped aircraft.

■ De-conflicts multiple threat targets simultaneously. Typical TCAS systems track up to 150 intruders and will display 30 with the highest threat potential.

■ TCAS mode S transponders communicate with each other to mutually coordinate evasive actions.

■ Inhibits descent maneuvers when close to the surface to prevent controlled flight into terrain (CFIT) related to a TCAS RA.

TCAS cannot correct the situation when aircrews ignore advisories or perform maneuvers contrary to TCAS instructions. A delay in responding to the TCAS advisory causes the required evasive maneuver rate to increase.

U.S. Army procedures

The U.S. Army operating procedures in the fixed-wing ATMs and approved supplements clearly make TCAS RAs higher priority than ATC clearances or instructions. When there is an apparent conflict between the two, respond to the TCAS RA. Federal Aviation Administration (FAA) procedures in Advisory Circular (AC) 120-55A state: "For TCAS to work as designed, immediate and correct crew response to TCAS advisories is essential. Delayed crew response or reluctance of a flightcrew to adjust the aircraft's flightpath as advised by TCAS due to ATC clearance provisions, fear of later FAA scrutiny, or other factors could significantly decrease or negate the protection afforded by TCAS. ...Even if a TCAS RA maneuver is inconsistent with the current clearance, respond appropriately to the RA."

Fixed-wing aircrew members are reminded that Army TCAS operating procedures mandate that:

■ Crewmembers are authorized to deviate from an ATC clearance and will do so in order to correctly respond to an RA. Crewmembers will utilize the TCAS as the primary means of collision avoidance.

■ When IMC, flight crews will respond to an RA, and report to ATC as soon as workload permits with "Call Sign, TCAS Climb/ Descent."

■ When VMC, flight crews are authorized to disregard an RA if, and only if, both crewmembers have absolutely identified, beyond any doubt, the traffic which caused the RA. If either crewmember has any doubt, then respond to the RA.

No one thing causes an accident; it is always a chain of events. If any one of the links in the chain is broken, the accident is avoided. In the absence of other information, it appears that if the TU-154 crew had followed their TCAS advisory instead of the ATC clearance, the accident would have been averted. ■

—CW4 Rick Williams, DES Fixed-Wing Branch, DSN 558-2453 (334-255-2453); richard.williams@rucker.army.mil

Internet Survey Results:

Apache Pilots Talk About HMD Issues

In a previous issue of Flightfax, the U.S. Army Aeromedical Research Laboratory (USAARL) asked Apache pilots to fill out an Internet survey that asked about their experience with the AH-64 Apache's helmet-mounted display (HMD), known as the Integrated Helmet and Display Sighting System (IHADSS). A total of 216 aviators responded to the survey. The survey primarily addressed HMD-related visual problems and helmet fit, which is critical in HMD use.

The IHADSS is a monocular HMD design that presents forward-looking infrared (FLIR) imagery and symbology to the right eye only. There has always been concern that this design could cause some visual performance problems related to eye dominance and binocular rivalry. Of the 216 pilots responding to the survey, 84.3 percent reported preferring their right eye (right eye dominant). When asked if their better (preferred) eye is the same as it was prior to AH-64 experience, 63.4 percent felt there had been no change, but over one-third (35.6%) felt the vision in their preferred eye had changed.

When the IHADSS is in use, the right eye views the HMD imagery and the left eye views the outside world. In the survey, most pilots (74.5%) reported no problem in alternating between their two eyes during flight. Almost half (44.9%) have developed methods to assist in switching their visual inputs when required. However, 64.4 percent reported that during flight, their visual input sometimes unintentionally alternates between the two eyes.

Prolonged flight with HMDs, coupled with the unique characteristics of the monocular IHADSS, can result in increased visual workload. This can show up as visual discomfort, headaches, blurred or double vision, or afterimages. These symptoms can occur both during and after flight. In addition, static and dynamic illusions, such as poor distance estimation and perception of false motion, also can occur.

The most common visual symptom reported during flight was visual discomfort (81.5%), followed by headache (60.6%). The most common complaint reported after flight was also visual discomfort (74.1%), followed by headache (62.5%). The most frequently reported degraded visual cue was decreased resolution (90.3%), and 84.7 percent reported experiencing impaired depth perception. Of the static and dynamic illusions reported, 80.1 percent reported faulty slope estimation, and 78.2 percent reported undetected drift.

The critical crew action to avoid these anomalies is to ensure they have a properly-fitted helmet. Helmet fit is critical to the pilot's ability to effectively use the IHADSS. When asked about satisfaction with their current IHADSS fit, 68.1 percent reported being somewhat or completely satisfied with their helmet fit, while 17.1 percent were either somewhat or completely dissatisfied with their current fit.

What to do

If you or a fellow crewmember in your unit has a helmet-fitting problem, see your ALSE technician or flight surgeon. If problems cannot be corrected locally, contact USAARL for a referral or further evaluation. ■

Editor's note: The full USAARL Report No. 2002-02 can be viewed in the Technical Reports section at **http://www.usaarl.army.mil**.

—Clarence E. Rash, Research Physicist, U.S. Army Aeromedical Research Laboratory (USAARL), DSN 558-6814 (334-255-6814), clarence.rash@se.amedd.army.mil

Reported Visual Symptons

	During Flight			After Flight		
	Never	Sometimes	Always	Never	Sometimes	Always
Visual discomfort	18.5	76.4	5.1	25.5	66.2	7.9
Headache	38.9	59.7	0.9	36.1	61.1	1.4
Double vision	93.5	6.0	0.5	93.1	4.6	0.5
Blurred vision	66.2	33.3	0.5	63.0	36.6	0.5
Disorientation	57.4	42.1	0.0	88.4	9.7	0.0
Afterimages	70.4	27.3	1.9	51.9	41.7	5.1

USASC Announces New Interactive Feature

A new feature is now available for searching words or phrases in the Army Safety Management Information System (ASMIS) accident database. This capability utilizes several search techniques within the database description/narrative fields. The narrative fields for ground reports include the sequence of events, tasks and errors, corrective action, materiel failure, and environmental text. The narrative fields for aviation reports include the synopsis, summary, analysis, findings, and recommendations text.

To access the search option, simply go to the Risk Management Information System (RMIS) web page, **(http://rmis.safety.mil)** and enter your RMIS user ID and password. If you do not have an account, you can apply for one with the "Request ID" button.

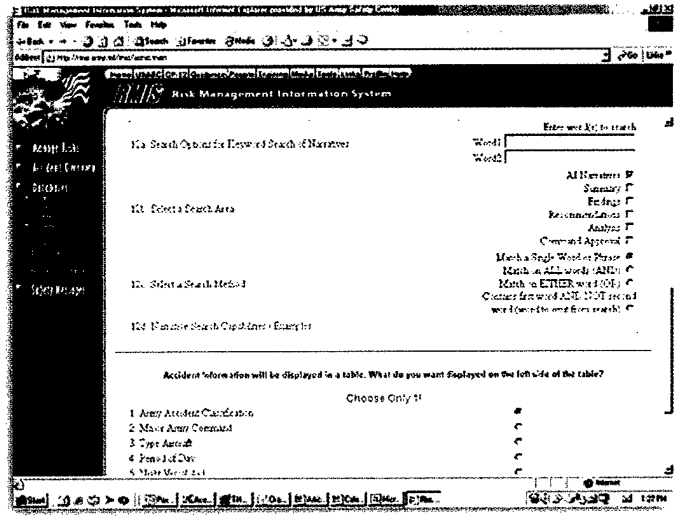
Once you are on the RMIS main web page, click on the "Databases" field on the left side. Next, select "Aviation" or "Ground" on the list, and then click on "Search Tools."

The "Search Tools" option allows you to search either a parameterized-type query or a broad word search on all accident records. The first screen of the "Search Tools" selection displays the query options that are available. Default options are shown for each question and can easily be changed by selecting a different item from each drop-down box. By carefully choosing the answers to define your search, you can improve the response time of your query and obtain better results.

The last question shows the word search capability and the bottom half of the query screen shows the display options for your result.

You can enter a word or phrase in the first box, or you can enter two separate words in each box that describe what you are looking for. The database provides a variety of query types with unique capabilities for effective text retrieval. For example, the phrase "power management" matches the narrative text that contains both words together. Also, the last section of the search question includes a help feature with examples. After you have made your selections, click on "Retrieve Information" at the bottom of your screen.

This database search engine is not case sensitive; for example, you can enter "tank," "Tank," or "TANK." You also can use wildcard matches, such as the "%" sign. In addition, the system can normalize known misspellings and uses word derivations such as "destroy," "destroys," or "destroying." The third part of the search question allows for compound or Boolean-type queries such as "and," "or," or "not" ; e.g., "rollover" and "roll over" using the "OR" query for either of these two words to be found in the narrative text.



The second part of the query question allows you to select what type of narrative to use for the search; the default is "All Narratives." You can select more than one type of narrative when not selecting "All Narratives." Be aware that if you select all narratives, the result time may be quite long. Additionally, the query may return a case where the text was found in one type of narrative (i.e., analysis) and the narrative type is not currently displayed on the web report form on the screen. Future improved web accident forms will include more blocks and narratives from all of the various accident reports. The groups of records returned from the search are then displayed on the next page in a matrix format based on the options you selected on the previous screen. You can subsequently narrow down to specific accident records of interest by selecting the number in the matrix box for "Accident Count."

The next screen displays the case number and a short description of the accident. The text search occurs on the database narrative fields, not on the short description displayed or the actual blocks on the accident forms. Once you click on the case number, the actual accident report case will be displayed. You can search the screen display with the Windows Explorer "find" tool to look for the word or phrases you searched on. You can also save the file to your local computer or print out the report.

We are always looking for new ways to deliver accident data in a well-designed format that reflects the breadth and depth of the ASMIS database. We welcome your feedback. If you have any questions or need assistance, please call our Help Desk at (334) 255-1390 or send e-mail to helpdesk@safetycenter.army.mil.

—LTC Mike Reed, Director, Support Directorate, U.S. Army Safety Center, DSN 558-9280, (334-255-9280), mike.reed@safetycenter.army.mil

POV

Accident Prevention Changing Attitudes and Behavior

The majority of Army fatalities still result from privately owned vehicle (POV) accidents. Our Army's senior leadership has repeatedly challenged all of us to redouble our efforts and get our arms around this needless drain on readiness. Across the Army, we've made valiant attempts with good success in some units. But, overall, we've all found that this has proven to be a difficult mission to accomplish.

Of the 206 total Army fatalities in FY02, 113 were the result of POV accidents. This figure represents an unacceptable 14-percent increase above the 99 POV fatalities recorded in FY01. Causal factors continue to include aggressive driving, speed, fatigue, and failure to wear seatbelts.

The biggest increase in fatalities is attributed to motorcycle accidents—a 54-percent increase over last year. Motorcycle-specific accident causes include aggressive driving, speed, alcohol, and failure to wear a helmet. A major contributing factor is that many of these soldiers did not attend the Motorcycle Safety Course. As leaders, it is incumbent upon us to mandate that any soldier riding a motorcycle complete this course BEFORE they operate a motorcycle.

Although the Army's traffic fatality rate is about 20 percent less than the Nation's, past POV accident analysis shows that the Army's accident experience closely mirrors the Nation's when it comes to age, gender, and types of accidents. For example, Army male drivers under the age of 25 are the most likely age group to become involved in fatal accidents because they often tend to underestimate the hazards and overestimate their personal abilities. It's that "I'm young, I'm invincible, I'll live forever" mentality. Sadly, young soldiers often are not as invincible as they think they are.

The big difference between the Army and the general public, of course, is that we, as Army leaders, can exert more control over soldier behavior.

We owe it to our soldiers to work diligently to change their attitudes and behaviors regarding POV safety, and the individual in the best position to effect that change is the squad leader.

The squad leader knows which soldiers are out late at night, which soldiers are always rushing, and what kind of cars they drive. The squad leader also knows that those soldiers are taking risks. He or she has to get in the head of that soldier and intervene.

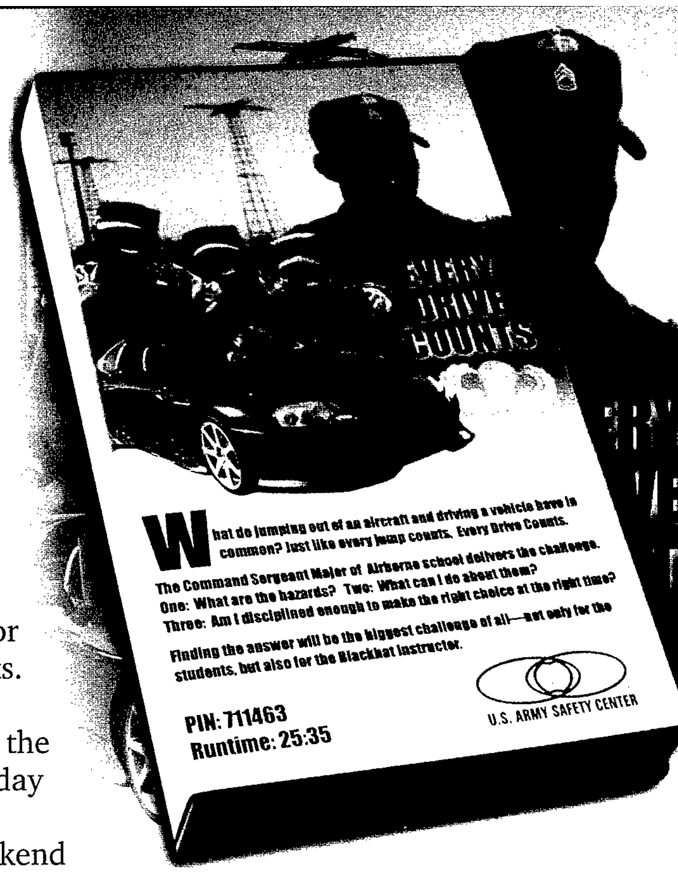
Attitude and behavior will not be changed with unit safety briefings alone. Policies may state that safety briefings are mandatory, but that doesn't change behavior. At safety briefings, soldiers may not be paying attention. Sometimes they are thinking about other things. Changing attitudes and behavior will happen only through education, training, and intervention.

The biggest increase in fatalities is attributed to motorcycle accidents—a 54-percent increase over last year. Motorcycle-specific accident causes include aggressive driving, speed, alcohol, and failure to wear a helmet.

There are a lot of intervention measures that leaders can use in units. One example: when bringing soldiers in from the field, clean up the equipment and hold soldiers overnight before releasing them. Soldiers are tired from stress and little sleep while in the field. As a commander, you can hold the unit for a rest and recovery period so that your soldiers won't be fatigued when hitting the highways. It may not make the soldiers happy, but it could prevent an accident.

It isn't just fatigue from a long week in the field that is a major cause of POV accidents. Another is soldiers rushing to get back to the PT formation on Monday morning. They often depart from their weekend destination late on Sunday night or in the early morning hours on Monday. Focused on getting back in time, they sometimes push it a little too hard and end up killing themselves at 0200 or 0300. The squad leader should know which of his or her soldiers will do this and has a moral responsibility to help change these soldiers' behavior.

"Every Drive Counts" is a new video that links the macho event of jumping out of aircraft and driving a vehicle. The central message is that just like every jump counts, every drive counts. Produced by the Army Safety Center, in



conjunction with the Airborne School, this additional intervention tool is available now at installation safety offices and local training service centers.

In the Army team, trust is critical. We, as leaders, have to build trust with soldiers; but communication in the form of lip service will not cut it. Soldiers quickly discern the leaders who truly care. Using intervention techniques such as holding the unit accountable may not make you a popular commander, but that is acceptable as long as you are respected as a commander. We must never forget that soldiers will judge us not by our words, but by what we do. Sometimes tough love is necessary, but it is well worth your being a bit unpopular if it saves a life.

—BG James E. Simmons, Director of Army Safety

ASO corner

Aviation Safety Officer Training

The Army Safety Center is responsible for training aviation safety officers for worldwide deployment and utilization. There are three safety programs offered for resident training. The first is the six-week Aviation Safety Officer (ASO) Course. The second is a two-week program preceded by a correspondence Phase I course. The third is a one-week ASO Update Course. The two and six-week courses are Military Occupational Specialty (MOS) producing for warrant officers and Additional Skill Identifier (ASI) producing for officers.

The six-week ASO Course (7K-F12) offers the most comprehensive training and is the most challenging. Two events are unique to this course. The first is an aviation accident prevention survey (AAPS) conducted at various locations nationwide. The AAPS consists of one week of on-site training to conduct surveys, write findings and recommendations, and prepare an out-brief for the participating unit. The survey is extremely beneficial for both the students and the unit. Students develop the skills and techniques to identify hazards in the workplace, and the unit receives a free look at their day-to-day operations and safety program. It is a positive experience for all concerned.

The second unique event for the ASO Course is the 9D5 Underwater Egress (Dunker) training. Classes are normally taken to Pensacola Naval Air Station (NAS), FL, for instruction. The swim tests are conducted in flight uniforms, boots, survival vests, and helmets. Successful candidates are then allowed to participate in the dunker qualification phase.

The experience of dunker training is not only for the benefit of the individual. In fact, the primary objective of dunker training is to provide each ASO with an experience base with which to use when advising his commander on the value and importance of overwater survival and underwater egress training. The training cannot be simulated. ASOs must experience first hand the lifesaving value and confidence building provided by the training. The ASO leaves the Army Safety Center not only better prepared for his own survival, but more capable of providing sound risk management advice to his commander.

How to apply

If you're interested in attending the ASO Course, submit a DA Form 4187 through your Personnel Administrative Center (PAC). Course information is contained in DA PAM 351-4, *U.S. Army Formal School Catalog*. You must be projected to go into an ASO position or currently serve in an ASO slot to attend the course. Course quotas are set by Department of the Army strength requirements and filled by PERSCOM, NGB, USARC, and IMSO. To attend the Phase II ASO Correspondence Course, you must first complete the Phase I ASO Correspondence Course IAW DA PAM 351-20, *Army Correspondence Course Program Catalog*.

For more information, contact CW4 "D" Smith, Director, Aviation Safety Officer Course, DSN 558-2376 (334-255-2376), smithd@safetycenter.army.mil.

ASO Course # 7K-F12		
03-001	7 Oct - 15 Nov 02	
03-002	6 Jan - 14 Feb 03	
03-003	24 Feb - 4 Apr 03	
03-004	14 Apr - 23 May 03	
03-005	14 Jul - 22 Aug 03	
ASO Update Course #7K-F21		
03-001	2 - 6 Dec 02	
03-002	2 - 6 Jun 03	
03-003	9 - 13 Jun 03	
03-004	8 - 12 Sep 03	
ASO Course # 7K-F18		
03-01	15 – 27 Jun	WAATS / SC961
03-02	17 – 29 Aug	EAATS / SC960

ACCIDENT BRIEFS

Information based on preliminary reports of aircraft accidents

AH-64

A model

■ **Class B:** During aggressive maneuvering to evade training surface-to-air radar, the pilot inadvertently allowed the main rotor blades (MRBs) to contact PNVS. As a result, two MRBs were damaged and a major portion of PNVS sheared off. Acft landed without further incident.

■ **Class C (Injury):** While positioning for hot refuel, a fuel handler sustained an injury when the right main landing gear tire of the aircraft contacted his right foot, subsequently resulting in a sprain and a chipped bone with anticipated lost time from duty.

CH-47

D model

■ **Class A (Damage):** Acft experienced brownout conditions on touchdown to LZ and landed hard. Front landing gear collapsed and upon emergency shutdown, front rotor blades contacted the fuselage.

MH-47

E model

■ **Class A (Damage):** While conducting a training flight with the aircraft turning from base leg of the traffic pattern to final, the crew smelled a strange odor. The cabin began to fill with smoke and the crew declared an emergency. Landing was to the taxiway and the attempts were made by the crew to extinguish the fire with handheld fire extinguishers. Ground firefighting equipment arrived three minutes after landing and extinguished fire. Fire originated in the rotor brake area.

■ **Class A:** While taxiing into a FARP, the main rotor blades of the chalk two aircraft struck the aft rotor blades of the chalk one aircraft that was stationary and refueling at the time.

MH-60

L model

■ **Class C:** During post flight following desert landing, crew noted damage to MRBs. Blades are suspected to have contacted ALQ-144.

■ **Class E:** During post flight following desert operations, crew noted damage to MRBs. Blades are suspected to have contacted ALQ.

OH-58

DR model

■ **Class C:** Acft experienced engine torque reading of 132% (for 1 second) and landed hard following simulated engine failure at altitude. Minor damage to landing gear; engine replacement required.

■ **Class C (Flight):** Flight of two was conducting NVG operations vicinity enter/exit point of terrain flight training area when chalk #2 noticed that they were in the wrong ravine. Chalk #2 began to scan the ridgelines when he detected power line poles. As he began to transmit this info to the lead aircraft, Chalk #1 struck three power lines. Acft landed without further incident. Damage includes a scratched windscreen and a voided MRB.

■ **Class C:** While the crew was conducting a FADEC operation, an engine overspeed occurred, resulting in rotor RPM reaching 124% and turbine 126%.

TH-67

■ **Class C:** While performing a standard autorotation, the student pilot pulled initial pitch too high and the aircraft touched down with low rotor RPM. Afct sustained damage to the isolation mount, K-flex coupling, swashplate, and transmission cowling.

UH-60

A model

■ **Class C:** Aircraft completed its landing to a stage field upon which its tail wheel strut failed.

■ **Class C:** Acft landed hard from a 10-ft hover. UNS antenna and searchlight punctured the belly of the acft, resulting in subsequent sheet metal damage; main landing gear WSPS damaged.

■ **Class C (Flight):** On takeoff, crew heard a loud bang in the #2 engine. Cockpit indications were #2 engine out light, #2 engine low RPM, and low rotor RPM. Pilots performed roll-on landing and emergency shutdown. Engine is being sent to CCAD-AID for teardown.

■ **Class C:** Acft hover taxied to runway for hit-check and noticed fluctuating engine oil pressure in ENG #1. Acft returned to ramp. On ramp, engine oil pressure went to zero. Emergency shutdown performed. Post flight inspection revealed engine oil filler cap missing. Engine removed and will be shipped to AVCRAD for overhaul.

Note: For more information on selected accident briefs, call DSN 558-9552 (334-255-9552). Information published in this section is based on preliminary mishap reports submitted by units and is subject to change.

COMING SOON TO A POST NEAR YOU!

Check below to see when the United States Army Safety Center Mobile Training Team will present the Risk Management Course at your facility.

2ND INFANTRY DIVISION – KOREA	16-20 DECEMBER
FORT KNOX, KY	6-10 JANUARY
FORT CARSON, CO	6-10 JANUARY
FORT HOOD, TX	6-10 JANUARY
FORT DRUM, NY	27-31 JANUARY
FORT DIX, NJ	23-28 FEBRUARY
SCHOFIELD BARRACKS, HAWAII	24-28 FEBRUARY
FORT BLISS, TX	10-14 MARCH
CAMP PARKS, CA	10-14 MARCH
FORT LEONARD WOOD, MO	24-28 MARCH
CAMP CASEY, KOREA	7-11 APRIL
FORT WAINWRIGHT, ALASKA	21-25 APRIL
FORT RICHARDSON, ALASAKA	28 APRIL – 2 MAY

If you don't see your facility represented here, call your Installation Safety Office and ask them to schedule a training visit at your installation.

For more information on the Risk Management Course or any of our other safety courses, please contact:

SFC Patricia Stoker
DSN 558-9854 (334-255-9854)
patricia.stoker@safetycenter.army.mil